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环境科学

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前　言

环境科学是一门复杂的、多种学科交叉的学科。它涉及到地理学、气象学、物理学、化学、人文学、生态学、医学等各个学科；它涉及到人类生活的各个方面。人们对环境的研究方法也同样涉及到各个学科领域。因为全球性的环境问题也是多种多样的：温室效应、酸雨、臭氧层匮乏、森林砍伐、全球气候变暖、污染、人口众多、沙漠化、能源危机、动植物物种灭绝等等。

为了全面展示环境科学涉及的内容，本书文章涉及到植物、动物、水资源、森林资源、贫铀弹、厄尔尼诺、沙尘暴、赤潮、污染处理、臭氧等等。无论我们从事的是哪个行业的工作，学习的是哪个学科，都要面对环境问题。因此要真正地保护好环境，我们每个人都不能等闲视之。通过阅读这些文章，读者还能了解到各个国家对环境的重视。

本书特点：

1. 时代性：语言素材新，阅读文章和对话都选自近几年的书籍与杂志。内容新颖，都是反映近几年来环境科学中大众关注的事情或现象。

2. 真实性：所选材料语言地道、真实。

3. 知识性：语言素材全面地反映了环境科学的各个方面：不仅涉及到各个方面的词汇，也涉及到各个

方面学生对环境科学的理解，以便增强环境保护意识。

4. 趣味性：阅读文章包括会谈、采访、对话多种题材。

5. 易懂性：为了便于读者理解原文，阅读文章前有背景知识或背景介绍，文章后有语言点的注释、难句翻译以及词汇和理解方面的练习并附有参考答案。

在编写的过程中，编者也深深感受到我们生存和生活环境的重要性和危机性。也希望读者能从中受到教育，增强责任感。为了我们唯一的生存环境，为了人类的后代，我们该做些什么?

书中有不足之处，恳请批评指正。

编 者

2002 年 2 月

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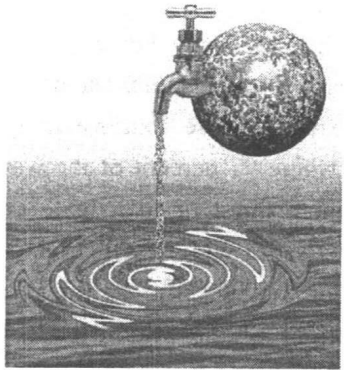
保护水资源：我们怎么办？



Approach 1: Seek New Sources

Extracting freshwater from the salty oceans is an ancient technique that is gaining momentum (增长的势头) in a high-tech way.

Approach 2: Redistribute Supplies

Transporting water in enormous bags may not be

such a crazy idea.

Approach 3: Reduce Demand

More than one billion gallons of water flow through New York City every day, and hardly a drop is wasted.

Approach 4: Recycle

In the world's arid regions, even sewage water cannot be thrown away.

Approach 1: Seek New Sources

1 A water-covered planet facing a water crisis seems paradoxical. And yet that is exactly the reality on planet Earth, where 97 percent of the water is too salty to quench human thirst or to irrigate crops. Tackling water-shortage issues with desalination—drawing fresh, drinkable water out of salty seawater—is common in the desert nations of the Middle East, the Caribbean and the Mediterranean. But as the cost of desalination drop and the price and demand for water climb, countries in temperate regions are turning more and more to the sea. Large-scale desalination facilities are even turning up in the U.S., one of the world's most water-rich countries. As part of an ambitious plan to reduce pumping from depleted underground aquifers, water officials in the Tampa Bay, Fla., area are

contracting the construction of a desalination plant capable of producing 25 million gallons of desalted water a day. They are relying on desalination to supplement the region's future water demands. Houston is also looking at desalinating water from the Gulf of Mexico to keep from going dry.

2 People have been pulling freshwater out of the oceans for centuries using technologies that involve evaporation, which leaves the salts and other unwanted constituents behind. Salty source water is heated to speed evaporation, and the evaporated water is then trapped and distilled. This process works well but requires large quantities of heat energy, and costs have been prohibitive for nearly all but the wealthiest nations, such as Kuwait and Saudi Arabia. To make the process more affordable, modern distillation plans recycle heat from the evaporation step.

3 A potentially cheaper technology called membrane desalination may expand the role of desalination worldwide, which today accounts for less than 0.2 percent of the water withdrawn from natural sources. Membrane desalination relies on reverse osmosis—a process in which a thin, semipermeable membrane is placed between a volume of saltwater and a volume of freshwater. The water on the salty side is highly pressurized to drive water molecules, but not salt and other impurities, to the pure

side. In essence, this process pushes freshwater out of saltwater.

4 Technical performance is important, but it alone does not drive the adoption of desalination as a source of clean water. With or without technical improvements, the market for desalination equipment will very likely show healthy growth in the next 10 years as cities and other consumers realize the potential and favorable economics of existing equipment, according to James D. Birkett, who runs West Neck Strategies, a private desalination consulting company based in Nobleboro, Me.

5 Hundreds of suppliers are already selling many thousands of pieces of equipment annually. These desalination units range in capacity from a few gallons a day (small emergency units for life rafts) to several million gallons a day (municipal systems). "So confident are the suppliers that they enter into long-term contracts with their customers," Birkett says, "thus assuming themselves the risks of performance and economics." The desalination plant on Tampa Bay, scheduled to be operational by the end of 2002, will be funded and operated in such a manner.

6 Today the best estimate is that about 1 percent of the world's drinking water is supplied by 12,500 desalination plants. No doubt, this is only the beginning. In the future, the water in your glass may have originated

in the seas.

Approach 2: Redistribute Supplies

7 Pipelines make it possible to move freshwater cheaply over vast distances of land. If only the same were possible over the oceans. Dragging waterproof plastic or fabric containers behind tugboats may be the answer.

8 Beginning in 1997, the English company Aquarius Water Trading and Transportation Ltd has towed water from mainland Greece to nearby resort islands in enormous polyurethane bags, helping the tourist destinations deal with increased demand for drinking water during the peak season.

9 Another company, Nordic Water Supply in Oslo, Norway, has made similar deliveries from Turkey to northern Cyprus using their own fabric containers.

10 The seemingly far-fetched concept of water bags was born in the early 1980s out of the desire to move large amounts of water more cheaply than modified oil tankers can do. Aquarius has manufactured eight 790-ton bags and two 2,200-ton versions; the latter hold about half a million gallons of water each. Aquarius has also developed models that are 10 times larger than the ones in use today, and last year Nordic began manufacturing bags that can hold nearly eight million gallons.

11 Water bags could offer a less expensive alternative

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to tankers—bags in the Aquarius fleet cost anywhere from $125,000 to $275,000—but some technical problems remain. In particular, making such large bags that are capable of withstanding the strains of an ocean voyage is difficult. For freshwater deliveries to the Greek isles and to Cyprus, bags need be dragged no farther than 60 miles. The piping systems needed to connect the bags to water supplies on land can be built from existing technology, but bags have ripped during transport on several occasions.

12 A third water-bag inventor, Terry G. Spragg of Manhattan Beach, Calif., is solving the problems of both volume and towing in a different way. With the support of privately hired scientists and consultants, Spragg has patented specialized zippers, with teeth more than an inch long that can link water bags like boxcars. He has demonstrated the technology but has yet to sell it for commercial use.

13 Thus far this technology has been used only for freshwater deliveries to emergency situations and to extremely water-scarce coastal regions with a reliable demand for expensive water. But for some communities with no other option, water bags may offer a new and clever solution.

Approach 3: Reduce Demand

14 New York City is a metropolis of flamboyant

excess, except when it comes to water. No one would suspect it, but the Big Apple has clamped down on water wasters, and after 10 years of patching leaky pipes and replacing millions of water-guzzling toilets, the city is now saving billions of Environmental Protection (DEP) stepped in with a three-year toilet rebate program, which began in 1994. With a budget of $295 million for up to 1.5 million rebates, the ambitious scheme set out to replace one third of the city's inefficient toilets—those using more than five gallons of water per flush—with water-saving models that do the same job with only 1.6 gallons per flush. With the rebate program, the DEP hoped to meet the largest part of its water-savings goal.

15 New Yorkers embraced the plan. Some 20,000 applications arrived within three days of its start. By the time the program ended in 1997, low-flow toilets had replaced 1.33 million inefficient ones in 110,000 buildings.

16 The result: a 29 percent reduction in water use per building per year. The DEP estimates that low-flow toilets save 70 million to 90 million gallons a day citywide—enough to fill about 6,700 Olympic-size swimming pools.

17 But more efficient flushes weren't enough. The toilet rebate program happened concurrently with the

city's water audit program, which continues today. For much of the city's history, the amount building owners paid for water was based on the size of their property. Following a law passed in 1985, however, the city began keeping tabs on water use and charging accordingly. The law dictated that water meters be installed during building renovations, and the same requirement was applied to construction of new homes and apartments beginning in 1988. As of 1998, all properties in the city must be metered. Homeowners who want to keep their water bills down under the new laws can request a free water-efficiency survey from Volt VIEWtech, the company that oversees the city's audit program.

18 Inspectors check for leaky plumbing, offer advice on retrofitting with water-efficient fixtures and distribute free faucet aerators and low-flow showerheads. Low-flow showerheads use about half as much water as the old ones, and faucet aerators, which replace the screen in the faucet head and add air to the spray, can lower the flow of water from four gallons a minute to less than one gallon a minute. Volt VIEWtech has made several hundred thousand of these inspections, saving an estimated 11 million gallons of water a day in eliminated leaks and increased efficiency.

19 In efforts to save even more water, New York City

has gone outside the home and into the streets. Water officials have installed magnetic locking caps on fire hydrants to keep people from turning them on in the summer.

20 The city is also keeping an eye underground by using computerized sonar equipment to scan for leaks along all 32.6 million feet (6,174 miles) of its water mains.

21 Although the city's population continues to grow, per person water use in New York dropped from 195 to 169 gallons a day between 1991 and 1999. From all indications, this trend is following its upward path. Water conservation works. And New Yorkers are proving that every flush makes a difference.

Approach 4: Recycle

22 In the world's arid regions, even sewage water cannot be thrown away. Namibia is the driest African country south of the Sahara Desert. Residents of the capital city, Windhoek, must do more than just conserve water to secure a permanent supply. They must reuse the precious little they have.

23 By the end of the 1960s, most underground aquifers and reservoirs on seasonal rivers near Windhoek had been tapped dry by the capital's burgeoning population, which has grown from 61,000 to more than 230,000 in the past

30 years. Transporting water from the closest permanent river, the Okavango—some 400 miles away—was too expensive. This crisis inspired city officials to implement a strict water conservation scheme that includes reclaiming domestic sewage and raising it once again to drinkable standards.

24 The city's first reclamation plant, initially capable of producing only 460 million gallons of clean water per year when it went on line in 1968, is now pumping out double that amount—enough to provide about 23 percent of the city's yearly water demands. Officials hope to boost that supply number to 51 percent with an upcoming facility now under construction.

25 To make wastewater drinkable, it must undergo a rigorous cleaning regimen.

26 First, large solids are allowed to settle out while biofilters remove smaller organic particles. Advanced treatments remove ammonia, and carbon and sand filters ensure that the last traces of dissolved organic material are eliminated. The final step is to purify the water by adding chlorine and lime. To guarantee a safe drinking supply, the reclaimed water is tested once a week for the presence of harmful bacteria, viruses and heavy metals. Compared with local freshwater sources, the reclaimed water is equal or better in quality.

27 Officials hope to support the recycling program

through enhanced public education—like letting the word slip that besides irrigating the city's greenery, treated wastewater is the secret ingredient in the prized local brew.

注释

paradoxical [ˌpærə'dɔksikəl] *a.* 自相矛盾的；荒谬的
desalination [di:ˌsæli'neiʃən] *n.* 脱盐（作用）
distil [dis'til] *v.* 蒸馏
reverse osmosis 逆渗透（一种从污水、盐水中提取纯净淡水的方法）
semipermeable membrane 半渗透性的薄膜
tugboat ['tʌgbəut] *n.* 拖船
polyurethane [化] 聚亚安酯
rip [rip] *vt.* 划破；撕 *vi.* 裂开，撕裂
tow [təu] *v.* 拖，拉
metropolis [mi'trɔpəlis] *n.* 大城市
clamp down on 施加压力，取缔
toilet rebate program 厕所节水项目（计划）
flush [flʌʃ] *n.* 冲洗（厕所等）
water audit program 审计水项目
faucet aerator 水龙头充气器
screen [skri:n] *n.* 滤网
fire hydrant 消防龙头；给水栓
computerized sonar equipment 计算机声控设备
arid ['ærid] *a.* 干旱的

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